Illinois Commerce Commission

Assessment of Commonwealth Edison Company

2000 Reliability Report

Pursuant to 83 Ill. Adm. Code 411.140

March 12, 2002

1. Executive Summary

ComEd prepared and filed its "2000 Electric Power Delivery Reliability Report" ("Reliability Report") on June 1, 2001, in compliance with Section 16-125 of the Public Utilities Act and the Commission's electric reliability rules as found in 83 Illinois Administrative Code, Part 411. ComEd divided its Reliability Report by referencing the applicable subparts of Part 411. This format made locating information easy in the current report as well as referencing materials in past reports.

Of the 104 worst performing circuits in ComEd's 2000 Reliability Report, nine represented repeats from either 1999 or 1998. While no circuits were listed as worse performing in all three years, the Commission is concerned that the number of repeats from the previous two years is indicative of inadequacies in inspections and completion of the needed corrective actions to the 1998 and 1999 worst performing circuits. Notable in Commission Staff field inspections of some worse performing circuits and some random inspections was the preponderance of tree contact and clearance problems observed. This was likely a contributing factor to many of the worst performing circuit repeats.

ComEd's reliability performance indices for its four regions covered the range from best to worst when compared to each other and all other jurisdictional utilities in the state. Illustrating this is ComEd's Northwest region CAIDI performance ranking of best in the state at 98 minutes, while ComEd's Northeast region ranked next to worse in the state at 170 minutes. ComEd's Chicago region SAIFI performance ranked the best at 1.05, while ComEd's Southern region was worse in the state at 2.05. The prevalence of tree contact and clearance problems observed by Staff, and noted earlier, may explain some of the poorer performance of the Southern and Northeast regions though conflicts were observed in all regions. The Commission will closely monitor future work plans to complete corrective tree trimming in 2002.

The number of transformers with peak loadings at or above 90% declined substantially from the summer of 1999 to the summer of 2000. In the Northeast and Northwest regions, the number of such transformers also declined materially from 1998 to 2000, while the Chicago region had the same number of such transformers in 1998 and 2000, and the number in the Southern region increased slightly from 1998 to 2000. It is noteworthy that the number of transformers with peak loading at or above 90% in the Southern region in 2000 was 2.1 to 2.6 times the numbers of such transformers in the other regions. These statistics contribute to concerns about the Southern region worsening reliability trend and hampered reconfiguration flexibility.

The year 2000 marks the midpoint of ComEd's reliability recovery effort that began in the fall of 1999 with the adoption of a comprehensive two-year recovery program. The significant deviations from ComEd's 1999 plan were included in the utility's 2000 reliability report. The deviations from the plan seemed reasonable.

While the above discussion covers the most significant items in a general way, eight specific recommendations are included in this Staff report, summarized beginning on page 22.

Table of Contents

1. Executive Summary i
2. Introduction 1
3. Assessment of ComEd's 1999 Reliability Report 1
4. ComEd's Historical Performance Relative to established Reliability Targets 4
5. Trends in ComEd's Reliability Performance 10
6. ComEd's Plan to Maintain or Improve Reliability 20
7. Potential Reliability Problems and Risks 21
8. Review of ComEd's Implementation Plan for the Previous Reporting Period 22
9. Summary of Recommendations 22

2. Introduction

Beginning with the year 1999, and at least every three years thereafter, 83 Ill. Adm. Code 411.140 ("Part 411.140") requires the Commission to assess the annual reliability report of each jurisdictional entity and evaluate its reliability performance. Part 411.140 requires the Commission to:

A) Assess the reliability report of each entity.

B) Assess the jurisdictional entity's historical performance relative to established reliability targets.

C) Identify trends in the jurisdictional entity's reliability performance.

D) Evaluate the jurisdictional entity's plan to maintain or improve reliability.

E) Include specific identification, assessment, and recommendations pertaining to any potential reliability problems and risks that the Commission has identified as a result of its evaluation.

F) Include a review of the jurisdictional entity's implementation of its plan for the previous reporting period.

This document assesses ComEd's "2000 Electric Power Delivery Reliability Report" ("Reliability Report"), filed on June 1, 2001, and evaluates ComEd's reliability performance for calendar year 2000. This is ComEd's third annual reliability report filed pursuant to code part 411. The organization of this document follows the order of the above listed requirements.

3. Assessment of ComEd's 2000 Reliability Report

ComEd provides electric service to over 3.4 million customers, or approximately 70 percent of the state's population. ComEd's service territory encompasses 398 municipalities in the northern one-fifth of Illinois, including the City of Chicago.

ComEd prepared and filed its 2000 Reliability Report on June 1, 2001, in compliance with Section 16-125 of the Public Utilities Act and the Commission's electric reliability rules as found in 83 Illinois Administrative Code, Part 411. ComEd organized the Reliability Report by the applicable subparts of Part 411.120 and 411.210. ComEd submitted an erratum dated June 22, 2001, to correct typographical and printing errors.

For the third year, ComEd divided its Reliability Report by referencing the applicable subparts of Part 411. This format made locating information easy in the current report as well as referencing materials in past reports.

ComEd listed 34,287 interruptions[1] that affected 10 or more customers for more than one minute in 2000. ComEd classified the 34,287 interruptions into 58 interruption cause categories. The following table lists some of the larger categories[2] of reported causes of interruptions for 2000, 1999 and 1998.

Table 1. Causes of Interruptions

	2000 Interruptions		**1999 Interruptions**		**1998 Interruptions**	
Cause of Interruption	Number of Interruptions	% of total	Number of Interruptions	% of total	Number of Interruptions	% of total
Total	34,287	---	36,061	---	46,289	---
Underground equipment	5,111	14.91%	6,756	18.75%	6,734	14.55%
Animal	3,633	10.60%	3,852	10.68%	2,892	6.25%
Tree	5,397	15.74%	5,005	13.88%	7,770	16.79%
Weather	9,015	26.29%	8,746	24.25%	12,002	25.93%
Other	1,722	5.02%	3,783	10.49%	3,149	6.80%
Unknown	575	1.68%	565	1.57%	8,418	18.19%

Two items from Table 1 are worth highlighting; first, the total number of interruptions reported by ComEd for 2000 decreased by 5% from 1999, which in-turn decreased by 22% from 1998. Secondly, the number of interruptions that ComEd classified as "unknown" cause decreased significantly from 8,418 (18% of the total) in 1998 to 565 (1.6% of the total) in 1999 and 575 (1.7% of the total) in 2000.

The five categories listed in Table 1 ("underground" through "other") amount to 74% of all interruptions in the 2000 Reliability Report. The combination of interruptions ComEd classified as being caused by either "weather" or "other" accounted for nearly one-third of all interruptions in ComEd's service territory in 2000.

Part 411.120(b)(3)(G) states that the utility is to report on the age, current condition, reliability and performance of its existing distribution and transmission system. ComEd's assessment of its performance (based on ComEd's self inspection and the resulting September 15, 1999, "Transmission and Distribution Investigation Report") stated[3];

> *"(in association with the August 1999 outages on ComEd system)… ComEd undertook an intensive inspection of the system. The inspection revealed an array of equipment in need of maintenance and repair, and a number of management and maintenance practices that required immediate remedy.*

[1] Page G-8 Table 12 of ComEd Reliability Report
[2] Page C-3 Table 5 of ComEd Report
[3] Page G-1 of ComEd Report

The Commission expects the reliability and performance of ComEd's distribution and transmission systems to improve as the equipment, management, and maintenance practices are improved in accordance with the September 15, 1999, report.

To comply with the requirement that a utility report on the age of its existing distribution and transmission systems, ComEd provided age data on seven types of equipment. The age data for each of the seven types of equipment included information on the median age, age distribution, and quantity by age. Table 2 lists the median age of the some of the equipment that ComEd reported.

Table 2. Median Age of Typical Equipment

	2000[4]	1999[5]	1998[6]
Lightning arresters	11 years	12 years	13 years
Underground cables	15 years	14 years	15 years
Wood poles (distribution)	32 years	31 years	32 years
Steel poles (transmission)	25 years	31 years	26 years
Distribution crossarms	25 years	24 years	25 years
Meters	19 years	21 years	22 years
Distribution transformers	18 years	22 years	20 years

The Commission believes that the median age of the existing equipment in service does not provide, by itself, an indication of possible reduction in reliability performance of the distribution or transmission systems. The age of the equipment in combination with an increase in the number of interruptions due to equipment failures or malfunction would provide a stronger basis to state if equipment is deteriorating to the point that it is reducing the reliability of the electric system.

Part 411.120(b)(3)(G)(v) states that the utility is to perform a satisfaction survey covering reliability, customer service and customer understanding of the utility's services and prices. Through a rulemaking the Commission designed and approved a single customer survey applicable to each Illinois Jurisdictional Entity on a yearly basis starting in 2000. These Entities joined forces and, through a competitive bidding process, selected Opinion Dynamics Corporation ("ODC") to implement the study. ODC asked customers to rate ComEd's performance on a scale of zero to ten where zero means the utility is doing a poor job and ten means the utility is doing an excellent job. An average rating or response to each question is presented on pages G-11 and G-12 of ComEd's 2000 Report. A summary of some responses is shown in Table 3.

[4] Page G-3 through G-5 of ComEd's 2000 Report
[5] Page G-32 through G-34 of ComEd's 2000 Report
[6] Page G-18 through G-20 of ComEd's 2000 Report

Table 3. Summary of Survey Results
(average rating on the zero-to-ten scale)

Customer Class		2000
Residential	Providing electric service overall (Overall Service)	7.63
	Providing reliable electric service (Service Reliability)	7.65
Non-Residential	Providing electric service overall (Overall Service)	7.67
	Providing reliable electric service (Service Reliability)	7.76

This survey format is not directly comparable to previous years' surveys. The Commission continues to recommend that ComEd focus on improving customer service.

4. ComEd's Historical Performance Relative to Established Reliability Targets

Part 411.140(b)(4)(A)-(C) sets forth the reliability targets that a jurisdictional entity should strive to meet. These targets specify upper limits on the number of interruptions and hours of interruption duration that a utility should strive not to exceed on a per customer basis. However, Part 411.120(b)(3)(K)&(L) does not require the utility to report individual customer interruption data until 2001. Table 4 summarizes the reliability targets defined in Part 411.140(b)(4)(A)-(C).

Table 4. Service Reliability Targets

Immediate primary source of service operation level	Maximum number of controllable interruptions in each of the last three consecutive years	Maximum hours of total interruption duration due to controllable interruptions in each of the last three years
at 69kV or above	3	9
between 15kV & 69kV	4	12
at 15kV or below	6	18

The service reliability targets above apply only to "controllable interruptions." A controllable interruption is defined in Part 411.20 as:

> *"…an interruption caused or exacerbated in scope and duration by the condition of facilities, equipment, or premises owned or operated by a jurisdictional entity, or by the action or inaction of persons under a jurisdictional entity's control and that could have been prevented through the use of generally accepted engineering, construction, or maintenance practices."*

ComEd used a statistical method, based on industry data, to determine the number of interruptions in the 1998 and 1999 Reports that were to be classified as controllable.[7] In the

[7] Page D-1 of ComEd 2000 Report.

review of the 1999 Report, the Commission found the use of industry data to determine the number of controllable interruptions to be unacceptable. The source and accuracy of the industry data is unknown, as is the applicability of the data to ComEd's system. For future reports, beginning with the 2001 Reliability Report, ComEd must develop the means to classify controllable interruptions on its system based on the facts surrounding each interruption. In a move towards fulfilling this requirement, in the 2000 Report ComEd performed a retrospective analysis of existing data in order to assign the "controllable" classification to certain interruptions. Thus, for the year 2000, ComEd classified 969 or approximately 2.8% of the total 34,287 interruptions as controllable.

Part 411.120(b)(3)(I)&(J) requires the reporting utility to list its worst performing circuits (subsection I) and then state (subsection J) what corrective actions are planned to improve the circuits' performance. ComEd selected its worst performing circuits from those distribution circuits with the worst performance (highest reliability index scores) from each operating area and for each of the three reliability indices. This list totaled 104 circuits, and ComEd classified them as its worst 1% performers. Per subsection J, ComEd listed the date, number of customers affected, length of time, and cause of each interruption for each of these 104 circuits. All of the work planned for these 104 circuits was to be completed by December 31, 2001. While in some cases adequate information was provided in the "cause" description, there were too many times the description was too cryptic to be of any use. Terms such as "Other", "Weather related – Extreme Heat", and "Weather related – Extreme Cold" do not provide enough information to adequately assess what the real problems may be for a particular feeder. See the general conclusions below about circuit inspections for more on this issue.

Circuit Inspections

To evaluate ComEd's planned and completed actions, Commission Staff requested detailed maps and work order information for 12 circuits, from which 6 circuits were selected and inspected in the field, along with some other random inspections. Circuits from each operating area of ComEd were selected. The purpose of the inspections was for Staff to verify that planned work was performed on the circuits and to see if there were any visible reasons for the poor performance of the circuits. For example, Staff looked for poor tree trimming practices, broken or damaged equipment, rotten poles, slack spans (sagging lines) etc.

Of the 104 worst performing circuits in ComEd's 2000 Reliability Report, nine represented repeats from either 1999 or 1998. Those circuits were as follows:

Table 5. Worst performing circuit repeats

Region	Feeder	Year of Previous Listing
Chicago	Y3851	1999
Chicago	Y8233Y	1998
Chicago	Z15054	1998
Chicago	Z5538*	1999
Northeast	A9417	1999
Northeast	C1217*	1998
Northeast	D3411	1999
Northwest	B236	1998
Southern	G6972	1999

*Inspected by Commission Staff for 2000 Report Review

While no circuits were listed as worse performing in all three years, the Commission is concerned that the number of repeats from the previous two years is indicative of inadequacies in inspections and completion of needed corrective actions to the 1998 and 1999 worst performing circuits. The Commission will be closely following future reports to see if this trend continues.

Summaries of items noted by Commission Staff during the distribution circuit field inspections of the ComEd circuits inspected this year are included in this report as Attachments A, B, C, D, E, F, and G. (As mentioned in the notes to Attachments A, B, C, D, E, F and G the summary for each of the circuits inspected represents typical observations noted by Commission Staff during the field inspections and **does not** represent all of the problems or potential problems that may exist on each circuit.) The following paragraphs describe the results of the field inspections of the six selected worst performing circuits as well as the random circuit inspections.

Chicago feeder Z5538 (Page J-25 of ComEd's 2000 Reliability Report): Repeat from 1999

This feeder covers an area between Burnham and Wolf Lake on the far south side of Chicago. This feeder is a repeat worst performing circuit from the ComEd 1999 Reliability Report. The reliability statistics for the past three years are as follows (see Table 6 for a definition of each statistic):

Chicago Z5538

Year	SAIFI	CAIFI	CAIDI (minutes)
2000	3.30	3.30	113
1999	0.07	1.00	699
1998	2.67	2.67	1,034

Of the nine interruptions recorded for Z5538 three were lightning related, one was wind related, one was tree related, two were other, one was animal related and one was accident by other. ComEd indicated that about $7,000 was spent making repairs at the time of interruptions and installing lighting arrestors at specific locations identified by field investigation. The date of the last ComEd circuit inspection was April 2, 2001.

The date of Commission Staff's field inspection was August 6, 2001, or four months after ComEd's last circuit inspection. A copy of Staff field notes and pictures for this circuit can be found in Appendix A. A few hardware problems were observed, such as bad pole tops (see Picture A1), missing brace bolts, damaged braces, missing guy markers, lack of guys on primary circuit corners, and, in one case, a missing phase wire (See Pictures A1, A4, and A5). Most of the observations, as apparent when reviewing the field notes, involved tree contacts and inadequate tree clearances (See Pictures A2 and A3). The trees for Chicago feeder Z5538 were reported to be last trimmed on October 10, 1999, and are next scheduled for trimming beginning on June 1, 2002.

Southern feeder F528 (Page J-66 of ComEd's 2000 Reliability Report)

This feeder covers parts of Glenwood, Lynwood, Ford Heights, and parts of rural Cook county. The reliability statistics for the past three years are as follows (see Table 6 for a definition of each statistic):

Southern F528

Year	**SAIFI**	**CAIFI**	**CAIDI** (minutes)
2000	5.13	5.13	123
1999	3.00	3.00	159
1998	3.54	3.54	740

Of the 27 interruptions recorded for F528 seven were lightning related, two were wind related, six were tree related, one was other, eight were equipment related and three were extreme heat or cold related. ComEd indicated that about $63,560 was spent installing additional lightning arrestors, recloser, tap fusing and replacing wire connectors at specific locations identified by field investigation. The date of the last ComEd circuit inspection was March 20, 2001.

The date of Commission Staff's field inspection was August 6, 2001, or five months after ComEd's last circuit inspection. A copy of Staff field notes and pictures for this circuit can be found in Appendix B. A number of problems involving tree contacts and inadequate tree clearances were observed (See Picture B1). Additionally, a number of other problems were observed, including ragged pole tops, split pole tops, missing ground wires, broken guy wires, slack spans, and badly leaning poles (See field notes – Appendix B). The trees for Southern feeder F528 were reported to be last trimmed on July 20, 1999, and are next scheduled for trimming beginning on July 28, 2002.

Southern feeder F126 (Page J-67 of ComEd's 2000 Reliability Report)

This feeder covers parts of South Chicago Heights, Steger, Crete, and Rural Will County. The reliability statistics for the past three years are as follows (see Table 6 for a definition of each statistic):

Southern F126

Year	**SAIFI**	**CAIFI**	**CAIDI** (minutes)
2000	4.78	4.78	285
1999	2.34	2.34	118
1998	2.81	2.81	1351

Of the 18 interruptions recorded for F126 two were lightning related, one was wind related, six were tree related, one was other, one was animal related, one was snow related, five were equipment related and one was a dig-in. ComEd indicated that about $28,300 was

spent installing additional lightning arresters, recloser, tap fusing, upgrade equipment brackets and replace inline conductor splices at specific locations identified by field investigation. The date of the last ComEd circuit inspection was March 16, 2001.

The date of Commission Staff's field inspection was August 7, 2001, or five months after ComEd's last circuit inspection. A copy of Staff field notes and pictures for this circuit can be found in Appendix C. Some problems involving tree contacts or inadequate tree clearances were observed. A number of other problems were also observed, including a splintered pole, missing guy markers, and a slack span into trees (See Picture C1). The trees for Southern feeder F126 were reported as being trimmed as of June 14, 2001, and are next scheduled for trimming beginning on August 19, 2002.

Northeast feeder C1217 (Page J-48 of ComEd's 2000 Reliability Report): Repeat from 1998

This feeder covers parts of Glencoe and Highland Park. This feeder is a repeat worst performing circuit from the ComEd 1998 Reliability Report. The reliability statistics for the past three years are as follows (see Table 6 for a definition of each statistic):

Northeast C1217

Year	**SAIFI**	**CAIFI**	**CAIDI** (minutes)
2000	4.30	4.30	236
1999	0.29	1.49	155
1998	6.74	6.74	266

Of the 14 interruptions recorded for C1217 two were lightning related, three were wind related, four were tree related, one was snow related, one was equipment related, one was vehicle related and two were dig-ins. ComEd indicated that about $15,000 was spent replacing multiple spans of overhead lines at one location and installing lightning arresters, tap fusing and trimming trees at specific locations identified by field investigation. The date of the last ComEd circuit inspection was April 20, 2001.

The date of Commission Staff's field inspection was August 8, 2001, or four months after ComEd's last circuit inspection. A copy of Staff field notes and pictures for this circuit can be found in Appendix D. All of the significant problems observed by Staff in the field involved tree contacts or inadequate tree clearances. Pictures D1 through D8 are representative of the types of problems observed. The trees for Northeast feeder C1217 were reported to be last trimmed on March 25, 1999, and are next scheduled for trimming beginning on November 1, 2001.

Northwest feeder E6028Y (Page J-72 of ComEd's 2000 Reliability Report)

This feeder covers parts of Barrington Hills. The reliability statistics for the past three years are as follows (see Table 6 for a definition of each statistic):

Northwest E6028Y

Year	**SAIFI**	**CAIFI**	**CAIDI** (minutes)
2000	4.85	4.85	251
1999	2.01	2.09	171
1998	3.24	3.24	278

Of the 12 interruptions recorded for E6028Y six were lightning related, four were tree related, one was animal related and one was accident by other. ComEd indicated that repairs

were made at the time of interruptions and no additional work was required. This is inconsistent with the previous four feeders where ComEd installed lightning arrestors for two or more outages related to lightning. The date of the last ComEd circuit inspection was March 8, 2001.

The date of Commission Staff's field inspection was August 8, 2001, or five months after ComEd's last circuit inspection. A copy of Staff field notes and pictures for this circuit can be found in Appendix E. Except for a low neutral and a missing guy marker, the remaining significant problems noted by Staff involved tree contacts and inadequate tree clearances such as those represented in Pictures E1 through E3. The trees for Northeast feeder E6028Y were reported to be last trimmed on June 16, 1998, and are next scheduled for trimming beginning on November 15, 2002.

Northwest feeder R6208 (Page J-75 of ComEd's 2000 Reliability Report)

This feeder covers parts of Rockford. The reliability statistics for the past three years are as follows (see Table 6 for a definition of each statistic):

Northwest R6206

Year	**SAIFI**	**CAIFI**	**CAIDI** (minutes)
2000	3.54	3.54	72
1999	2.29	2.35	185
1998	0.41	1.47	466

Of the 16 interruptions recorded for R6208 one was lightning related, five were tree related, one was other, one was unknown, three were equipment related, three were vehicle related, one was intentional for emergency repairs and one was accident by other. ComEd indicated that about $6,850 was spent installing additional tap fusing and trimming trees at specific locations identified by field investigation. The date of the last ComEd circuit inspection was May 2, 2001.

The date of Commission Staff's field inspection was August 9, 2001, or three months after ComEd's last circuit inspection. A copy of Staff field notes and pictures for this circuit can be found in Appendix F. A few hardware problems associated with bad pole tops and a missing guy marker were observed (see Picture F3), while the vast majority of problems observed were associated with tree contacts and inadequate tree clearances (see Pictures F1-F2, and F4-F6). Notably, several areas and streets appeared as if their trees had never been trimmed. The trees for Northwest feeder R6206 were reported to be last trimmed on May 21, 1998, and are next scheduled for trimming beginning on January 1, 2002.

Random Inspections

Random inspections were performed in parts of Calumet City, Chicago Heights, Homewood, Harvey, Rockford, Elgin, and Kankakee. A copy of Commission Staff field notes and pictures for these inspections can be found in Appendix G. The focus of the random inspections was to look for problems associated with tree contacts and inadequate tree clearances – of which many were found and the more significant were recorded in the Staff field notes. One hardware problem involving a broken lightning arrestors was noted (see Picture G7), as were efforts of ComEd to correct a line sag problem that had been observed previously by Staff. Pictures G1-G6 and G8-G10 were typical of the tree contact and inadequate tree clearance problems observed. Of note in Picture G5 is the apparent inability to operate a line disconnect switch without first trimming an intruding tree. Staff observed problems on parts of at least 18 feeder circuits in the random inspections. Of those 18 circuits, three had reportedly been trimmed in 1998, four had reportedly been trimmed in 1999, nine had reportedly been trimmed in 2000, and two had reportedly been trimmed in 2001.

General Conclusions

Generally, the maps provided by ComEd were relatively easy to follow.

The preponderance of tree contact and inadequate tree clearance problems observed by Staff leads the Commission to question the usefulness of some of the general "cause" descriptions used in part J of ComEd's Reliability Report to describe the causes of individual interruptions on the worse performing circuits. For instance, many interruptions that have been classified as weather related may in fact have a root cause based on tree contact or inadequate tree clearances. ComEd should review interruptions on the worse performing circuits to determine root causes and appropriately reflect them in the cause description details in future Reliability Reports.

Two of the six work descriptions (Northeast feeder C1217 at page J-48 and Northwest feeder R6206 at page J-72 of ComEd's 2000 Reliability Report) included tree trimming. Staff's field observations of prevalent tree contact and inadequate tree clearance problems would lead the Commission to expect that a larger number of the feeders would incorporate tree trimming in their work description and that the work would be more thoroughly implemented since Appendices D and F showed significant amounts of tree trimming remaining on C1217 and R6206. The Commission will closely monitor future work plans to complete corrective tree trimming in 2002.

As another general note, in a few instances Staff observed that guy markers were missing. While this is more of a public safety concern than a reliability concern, the Commission urges ComEd to replace missing guy markers on its downguys wherever they are exposed to public or private traffic.

5. Trends in ComEd's Reliability Performance

This is ComEd's third annual reliability report filed pursuant to code part 411. Listed on Table 6, below, are ComEd's reliability indices as reported in the 2000 Reliability Report (for all interruptions) for ComEd's system as well as each region in comparison to the system

values reported by the other jurisdictional utilities for that year. ComEd's system CAIDI performance ranks third (out of the six jurisdictional utilities) best behind AmerenCIPS and MidAmerican, while ComEd's system SAIFI ranks second best behind AmerenUE. When ComEd's regions are compared to the jurisdictional utilities and each other, the regions' performance covers the entire range from best to worst. ComEd's Northwest region CAIDI performance ranks best in the state (out of ten) at 98 minutes, while ComEd's Northeast region ranks next to worst in the state at 170 minutes. ComEd's Chicago region SAIFI performance ranks best in the state at 1.05, while ComEd's Southern region ranks worst in the state at 2.05.

Table 6

Comparison of reliability indices for 2000

	CAIDI (minutes)	**CAIFI** (interruptions)	**SAIFI** (interruptions)
ComEd System Total	144	2.08	1.43
ComEd Chicago Region	131	1.77	1.05
ComEd Northeast Region	170	1.99	1.44
ComEd Southern Region	150	2.44	2.05
ComEd Northwest Region	98	1.94	1.31
AmerenCIPS	103.89	2.23	1.54
AmerenUE	219	1.91	1.14
CILCO	151.2	2.29	1.75
Illinois Power	168	2.47	1.65
MidAmerican	121.22	2.16	1.521

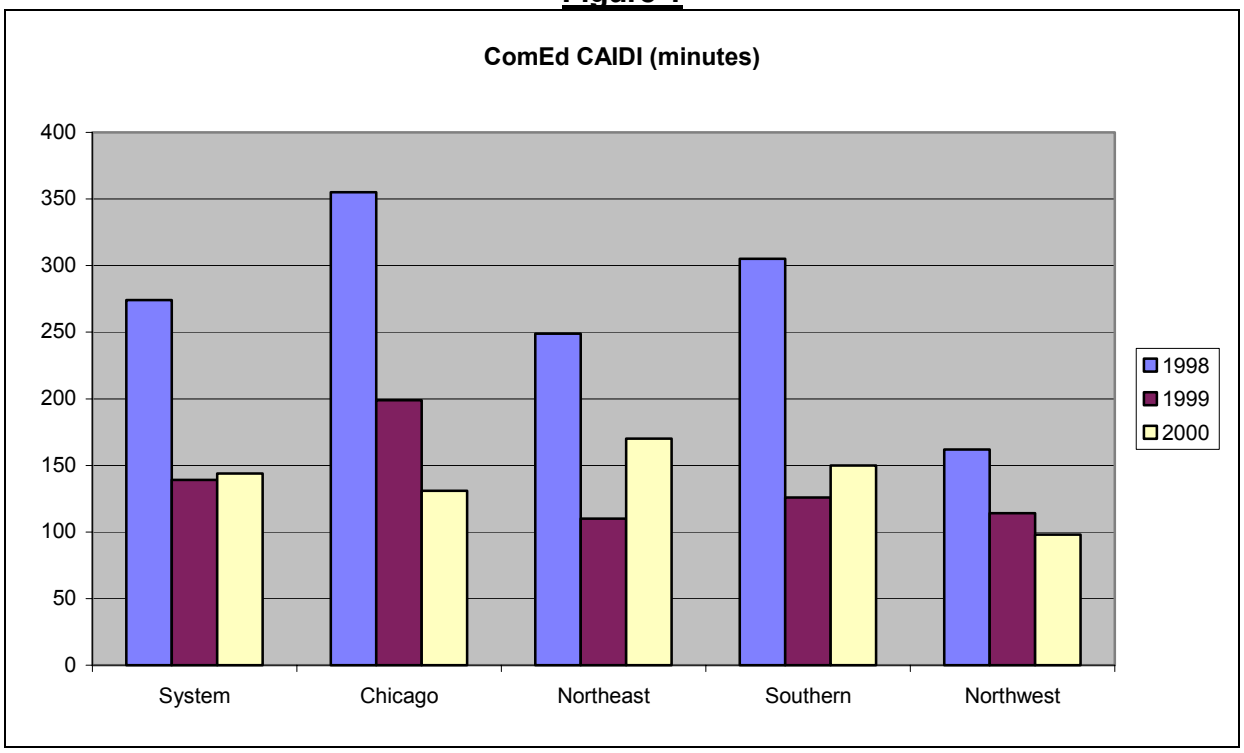
CAIDI: Customer Average Interruption Duration Report (cay' dee). This represents, for the group of customers that actually had one or more interruptions, how long, on average, the interruptions lasted.

CAIFI: Customer Average Interruption Frequency Index (cay' fee). This represents the interruption frequency for the group of customers that had interruptions. A CAIFI index much higher than SAIFI suggests that subsets of customers experienceed significantly more frequent interruptions than the overall system average.

SAIFI: System Average Interruption Frequency Index (say' fee). This represents the number of customer interruptions divided by total system customers.

The reliability indices required by the Commission rules and provided by ComEd include storm related interruptions. Of the three indices, CAIDI, Customer Average Interruption Duration Index, provides the most meaningful information associated with storm related interruptions. The Commission expects that the better designed and maintained an electric system is, the smaller the number or magnitude of storm related problems and the quicker the restoration of the electric system would be, resulting in a lower average customer interruption time (CAIDI index). Figure 1 illustrates ComEd's CAIDI indices over the last three years in each region.

Figure 1



In Figure 1 above, the Chicago and Northwest region's display a declining CAIDI trend from year to year. The pronounced worsening trend shown by Northeast region and the more moderate worsening in the Southern region contributed to the overall slight worsening in the CAIDI trend for the system from 1999 to 2000, and is a matter of concern to the Commission. ComEd should work to identify the reasons for the worsening CAIDI trends in the Northeast and Southern regions, and revise its reliability program as necessary.

Figure 2

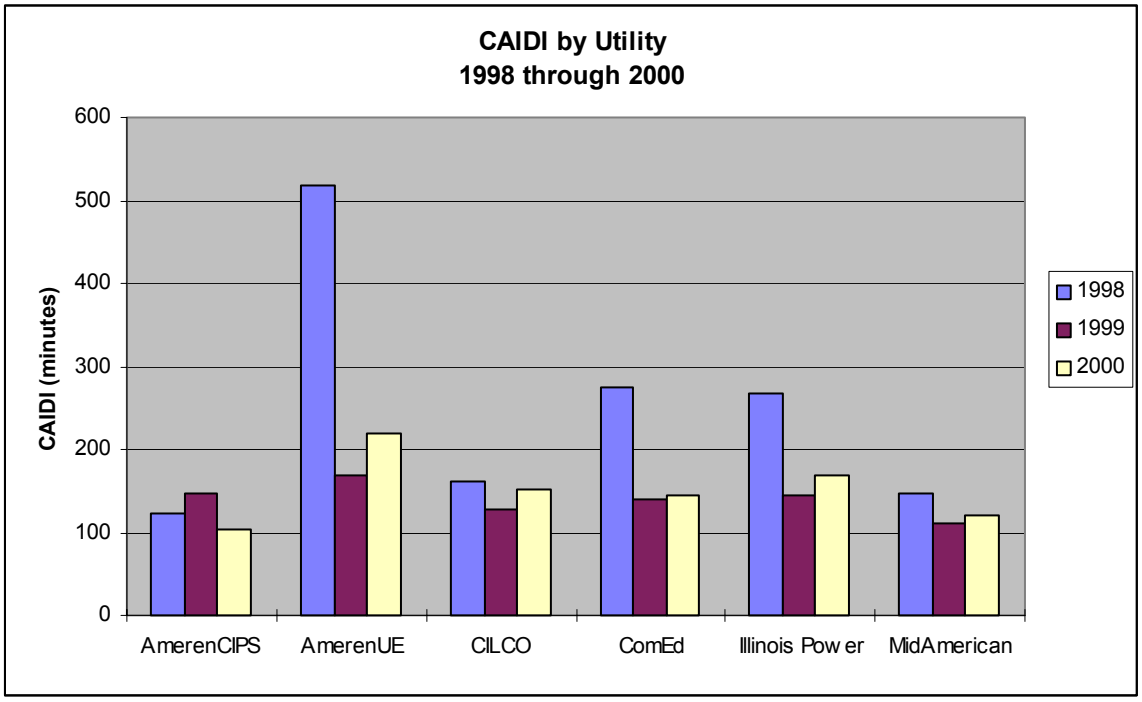
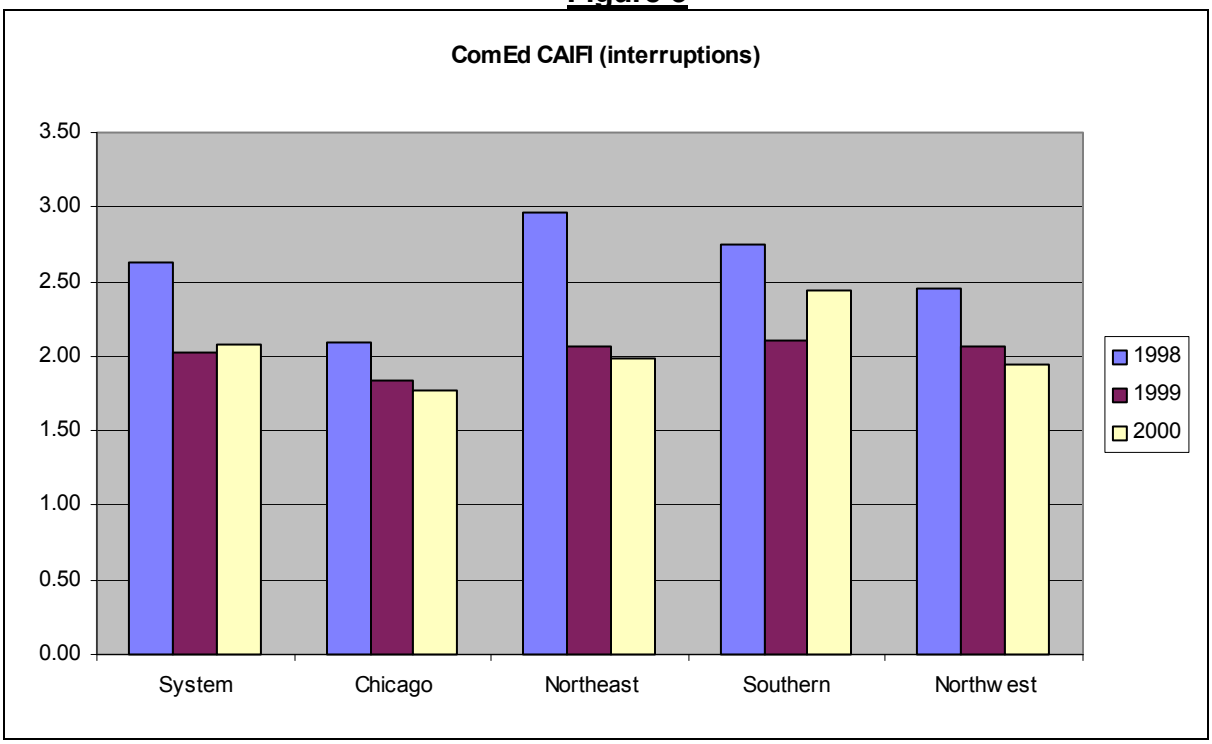


Figure 2 above shows a comparison of CAIDI values reported for the years 1998, 1999, and 2000 by the jurisdictional utilities. Storms throughout the state increased most utilities' CAIDI numbers in 1998, and when those exceptions are discounted, most CAIDI values fall within a relatively narrow band.

Figure 3



The Chicago, Northeast and Northwest region's display a declining CAIFI trend from year to year in Figure 3 above. The pronounced worsening trend shown by the Southern region contributed to the overall slight worsening in the CAIFI trend for the system from 1999 to 2000, and is a matter of concern to the Commission. ComEd should work to identify the reasons for the worsening CAIFI trend in the Southern region, and revise its reliability program as necessary.

Figure 4

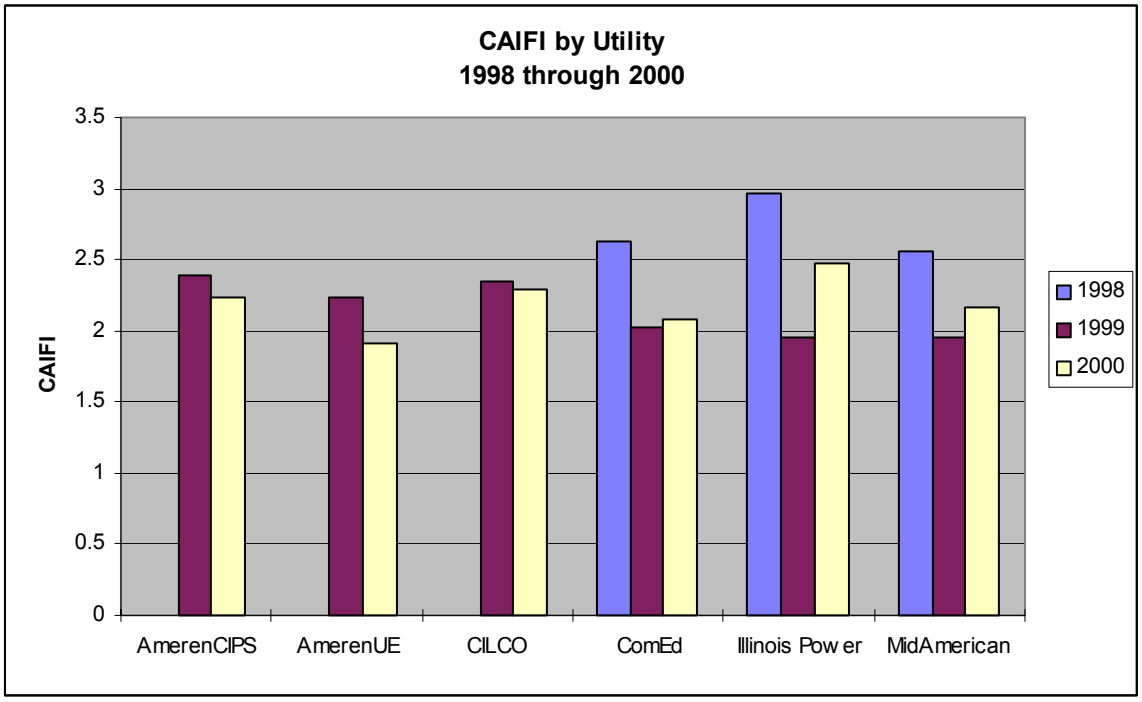
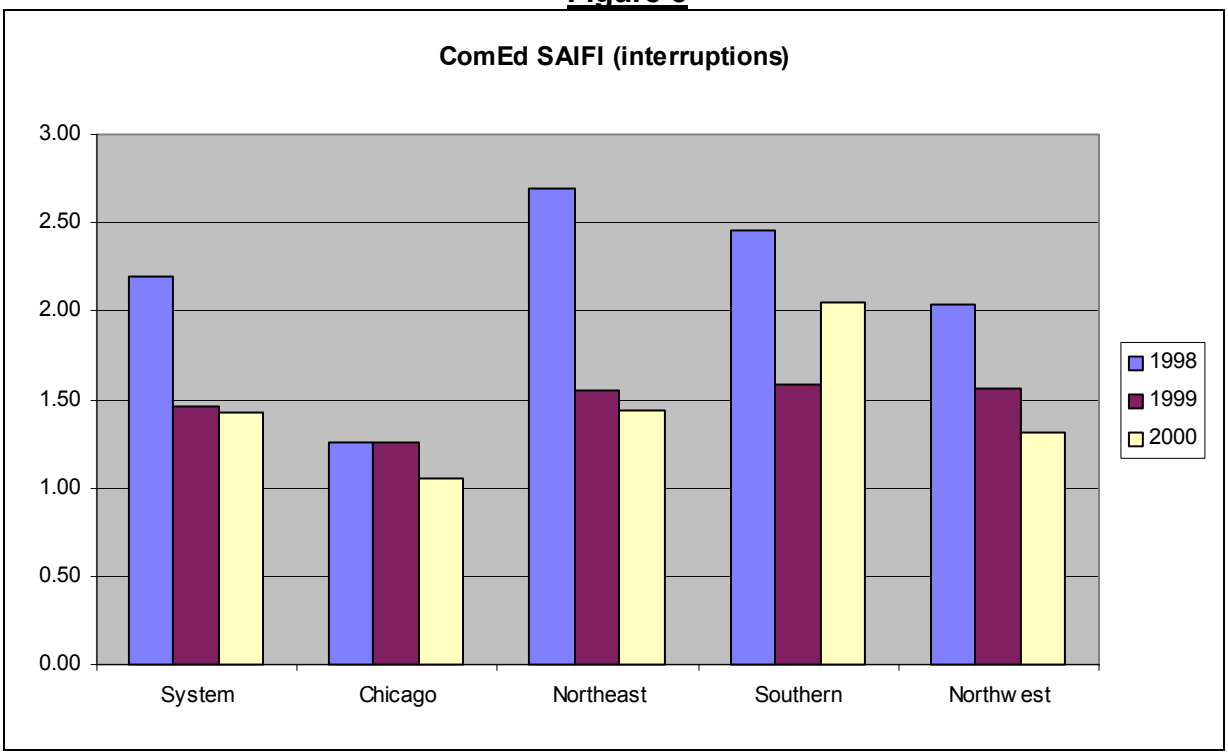


Figure 4 above shows a comparison of CAIFI values reported for the years 1998, 1999, and 2000 by the jurisdictional utilities (1998 values were unavailable for AmerenCIPS, AmerenUE, and CILCO). Storms throughout the state increased most utilities CAIFI numbers in 1998, and when those exceptions are discounted, most CAIFI values fall within a relatively narrow band.

Figure 5



The Chicago, Northeast and Northwest region's display a declining SAIFI trend from year to year in Figure 3 above. The pronounced worsening trend shown by the Southern region is a matter of concern to the Commission. Despite the Southern region's worsening, the System SAIFI displayed a continuing trend of improvement, albeit slight, from 1999 to 2000. ComEd should work to identify the reasons for the worsening SAIFI trend in the Southern region, and revise its reliability program as necessary.

Figure 6

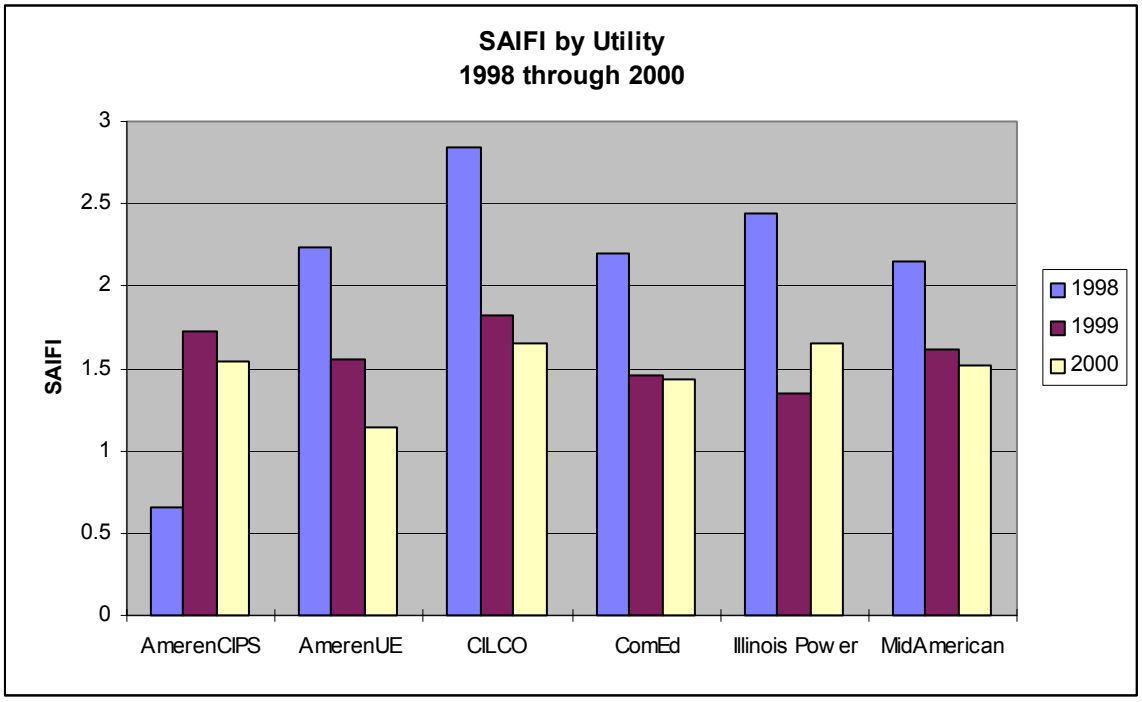


Figure 6 above shows a comparison of SAIFI values reported for the years 1998, 1999, and 2000 by the jurisdictional utilities. Storms throughout the state increased most utilities SAIFI numbers in 1998 with apparent improvement since then.

ComEd stated that their internal, reliability goals for system performance for 2001 are[8]:

SAIFI [non-storm]	1.06
CAIDI [non-storm]	85 minutes
CAIFI	No target established

For the definition of non-storm, ComEd makes their non-storm computations using the 83 Illinois Administrative Code Part 411.120(a) reporting threshold (10,000 customers experiencing interruptions for three hours) for determining when a "storm" has occurred.

Comparing ComEd's 2001 goals to the "non-storm" reliability indices for 2000, in Table 7 below, Staff observes that ComEd would be compliant with the CAIDI goal on a system basis and in all regions but Chicago. When compared to the SAIFI goal, only the Chicago and Northwest regions would be compliant, with the Southern region being substantially out of compliance compared to the Northeast region. Staff did not find this comparison predictive of actual performance when storms are included. Staff did note that the relative rankings of the four regions remained the same for SAIFI with and without storms (see Tables 6 and 7) and nearly the same for CAIFI. Northwest region would rank the best in CAIDI both with and without storms but Chicago region which was the worst without storms was second best with storms included and Northeast region which was second best (tied with Southern region) without storms was worst when storms are included (Southern region was next to worst).

[8] Response to DR ENG 1.22

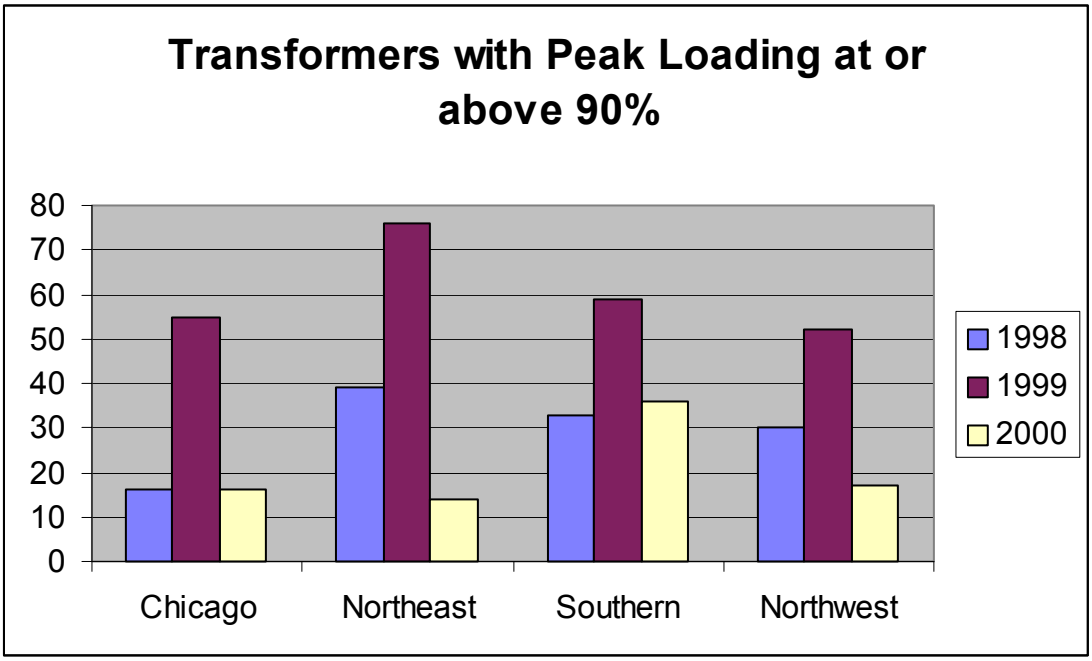
Table 7. Reliability Indices for 2000
Excluding Certain Storms[9]

	Chicago	Northeast	Southern	Northwest	System	*Internal 2001 Goal*
CAIDI (minutes)	88	81	81	76	82	*85*
CAIFI (# of interruptions)	1.65	1.75	1.96	1.75	1.80	*NA*
SAIFI (# of interruptions)	0.87	1.10	1.41	1.02	1.08	*1.06*

Part 411.210(b)(3) states that each utility having 1,000,000 or more customers is to provide a list of substation transformers that had a peak loading that equaled or exceeded 90% of their rated normal capacity. In the Assessment of ComEd's 1999 Report the Commission stated: "Starting with the 2000 report, ComEd should list the planned corrective actions and the amount of planned load reduction that will result for all the substation transformers loaded at or above 90% of their rating. ComEd should also indicate when the action is scheduled to be completed." ComEd indicated in its 2000 Reliability Report that corrective action is not necessary except "if a transformer does have a peak loading in excess of 100% of its normal rating capacity, we do take corrective action, as we recognize that if left unattended, such loading can increase over time to the point of transformer failure."[10] Accordingly, ComEd only pursued corrective actions for those transformers that were loaded more than 100%. Figure 7 shows the distribution of those transformers with peak loading at or above 90% by region for each of the reporting years.

[9] Page H-2, Table 18b, ComEd 2000 Report
[10] Page b.3-1 ComEd 2000 Report

Figure 7

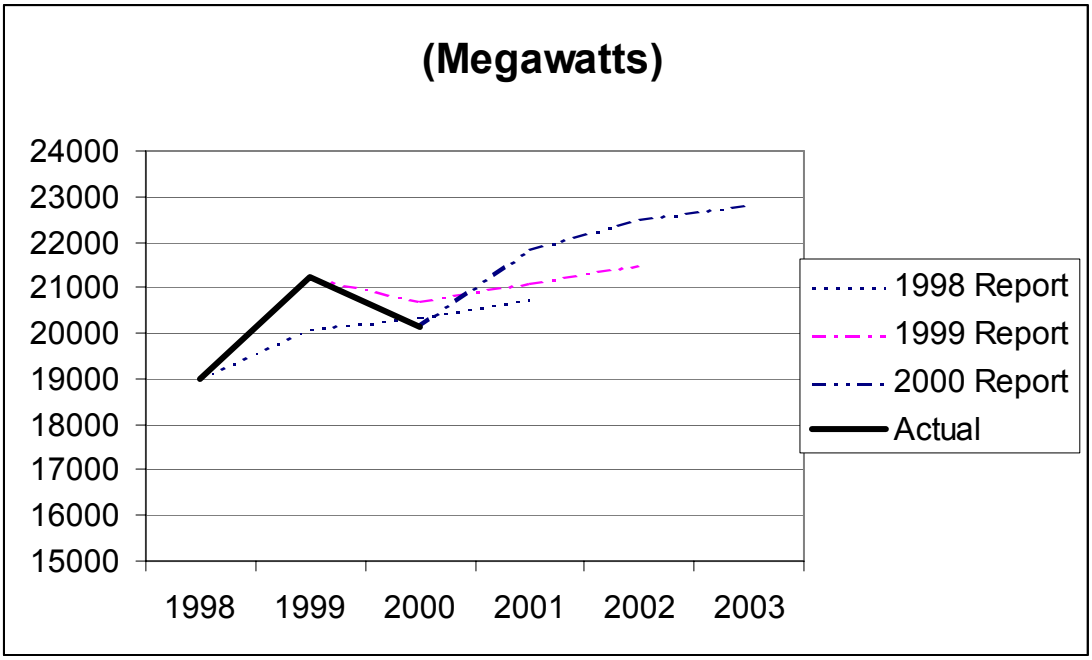


The Commission notes that the number of transformers with peak loadings at or above 90% declined substantially from the summer of 1999 to the summer of 2000. While some of this improvement may be directly attributable to the reliability improvement programs of 2000, the fact that the actual 2000 peak load was less than the 1999 actual peak load was also a significant factor, Figure 8. In two (Northeast and Northwest regions) out of four regions, the number of transformers with peak loadings at or above 90% declined materially from 1998 to 2000, while the Chicago region had the same number of such transformers in both years. When compared to 1998, the number of such transformers increased slightly in the Southern Region in the summer of 2000. The Commission further notes that the number of transformers with peak loading at or above 90% in the Southern region in 2000 was 2.1 to 2.6 times the numbers of such transformers in the other regions. This condition is of concern to the Commission and will receive closer scrutiny in future reports.

The Commission is concerned that high transformer loadings can impact reliability in two ways: (1) when a substation transformer is loaded over its normal capacity rating, the likelihood that the transformer may fail increases due to the cumulative thermal deterioration from overloading; and (2) when a transformer is highly loaded, this removes system reconfiguration flexibility when other failures occur in the system or when greater than expected load growth occurs.[11]

[11] A 40MVA substation transformer loaded at 95% would have only 2MVA capacity to spare to pick up load from another substation transformer before being loaded over its normal capacity rating.

Figure 8
System Coincident Peak Demand and Projected Load for Average Hot Weather



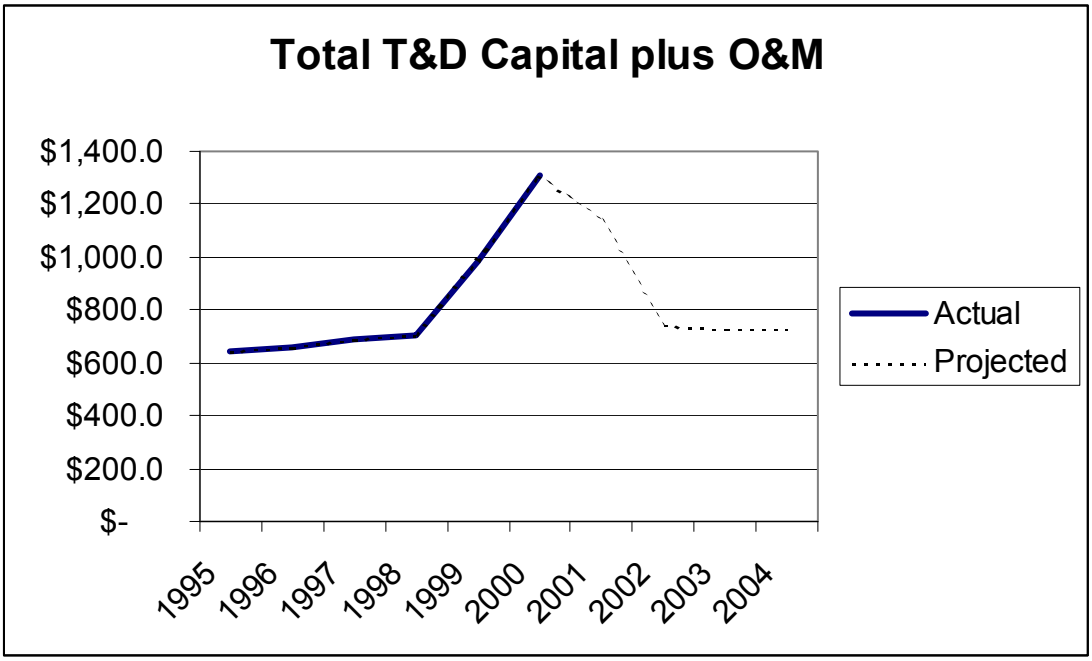
6. ComEd's Plan to Maintain or Improve Reliability

Part 411.120(b)(3)(A) states that the utility is to include a future investment plan within its report. The year 2000 marks the midpoint of ComEd's reliability recovery effort that was hallmarked with the printing of the ComEd September 15, 1999, report "A Blueprint for Change" and the December 15, 1999 report "Consolidated Quarterly Report for the Illinois Commerce Commission and the City of Chicago". Pages A-1 through A-7 of the 2000 Reliability Report detail ComEd's plans for future investment. A detailed analysis[12] of actual and projected spending patterns shows, Figure 9, total transmission and distribution capital plus O&M spending peaking in 2000 and then declining to a levelized value that is higher than in pre-1999 years.

This spending pattern is consistent with what would be expected of a reliability recovery plan intended to catch up quickly (in this case two years) on projects and practices deferred or ignored in the past.

[12] Responses to Y1999 ComEd Report Data Requests ENG 1.7, ENG 1.8, ENG 1.9, ENG 1.10; Y2000 ComEd Report Data Requests ENG 1.6, ENG 1.7, ENG 1.8, ENG 1.9, ENG 1.10R1, ENG 1.11R1, ENG 1.10, and ENG 1.11

Figure 9



Based on information provided in ComEd's 2000 Reliability Report, it is not possible for the Commission to determine if all of ComEd's operating areas' reliability issues are being addressed equally. ComEd did not list their improvement plans by operating area in this year's report because they "invest on a project basis, not by geographic region, and spend the amounts necessary to achieve system-wide reliability."[13] While that may be true, ComEd should know where their projects are located. ComEd should list the planned reliability improvement investments by operating area in addition to system totals.

7. Potential Reliability Problems and Risks

In its 2000 reliability report, ComEd reported that 42% of interruptions were weather and tree related. While ComEd claims to be on a four year tree trimming cycle[14] Staff's observations in the field draws the Commission to conclude that ComEd is either off of a four year cycle or it is on a four year cycle with very serious quality control problems. The end result is the same. In spite of the preponderance of tree contact and inadequate tree clearance problems observed by Staff in the field, only the work description[15] for Northeast feeder C1217 and Northwest feeder R6206 appeared to try to address that problem. As Staff field notes indicate,[16] there was still plenty of tree trimming work remaining on feeders C1217 and R6206.

[13] Page A-2 ComEd 2000 Report
[14] ComEd stated that this was achieved on May 18, 2000 – page B-2 of ComEd 2000 Reliability Report
[15] Pages J-48 and J-75 of ComEd 2000 Reliability Report
[16] See Appendix D and F

ComEd should address all causes of interruptions on worst-performing circuits in its planned actions for improving the performance of those circuits. To facilitate this, ComEd should perform complete and thorough field inspections of the worst-performing circuits and use the information gained to check the quality of its reliability programs and standards.

When the performance indices for all the regions are compared to the other jurisdictional entities in the state for 2000, the Southern region is the worst with a SAIFI of 2.05. The Southern region's CAIFI of 2.44 was slightly better than IP's CAIFI of 2.47 giving the Southern region ranking of next worst for CAIFI in 2000. The Southern region did perform better with a CAIDI of 150 minutes, for a ranking in the middle of the pack while the Northeast region came in second worst with a CAIDI of 170 minutes. As noted in Figures 1, 3, and 5 of this report, the Southern region has experienced worsening of its CAIDI, CAIFI, and SAIFI reliability indices in the1999 to 2000 trend, while the Northeast region has experienced a worsening in its CAIDI trend. ComEd should work to identify the root causes for the new trends of worsening 1999 to 2000 reliability indices for the Southern and Northeast regions, and revise its reliability program as necessary to address those causes.

8. Review of ComEd's Implementation Plan for the Previous Reporting Period

A report on the significant deviations from ComEd's 1999 plan was included in its 2000 reliability report in pages B-1 through B-10. The plan for 2000 was integrally related to the comprehensive two-year recovery program that ComEd adopted in September 1999. The deviations from the plan seemed reasonable.

9. Summary of Recommendations

The Commission recommends that ComEd take the following actions:

1. The Commission continues to recommend that ComEd focus on improving customer service.
2. For future reports, beginning with the 2001 Reliability Report, ComEd must develop the means to classify controllable interruptions on its system based on the facts surrounding each interruption.
3. ComEd should review interruptions on the worse performing circuits to determine root causes and appropriately reflect them in the cause description details in future Reliability Reports.
4. The Commission urges ComEd to replace missing guy markers on its downguys wherever they are exposed to public or private traffic.
5. ComEd should list the planned corrective actions and the amount of planned load reduction that will result for all the substation transformers loaded at or above 90% of their ratings. ComEd should also indicate when the actions are scheduled to be completed.
6. ComEd should list the planned reliability improvement investments by operating area in addition to system totals.
7. ComEd should address all causes of interruptions on worst-performing circuits in its planned actions for improving the performance of those circuits. To facilitate this, Co-

mEd should perform complete and thorough field inspections of the worst-performing circuits and use the information gained to check the quality of its reliability programs and standards.

8. ComEd should work to identify the root causes for the new trends of worsening 1999 to 2000 reliability indices for the Southern and Northeast regions, and revise its reliability program as necessary to address those causes.